OBSERVATIONS ON MOSQUITOES DURING 1969 CONTROL OPERATIONS AT EDMONTON, ALBERTA

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Numbers of mosquito larvae and pupae in various types of ponds at sites in and near the City of Edmonton's mosquito control area were recorded. The type of pond influenced both the proportion of ponds with larvae and the numbers at the beginning of the season. Data on temporal and spatial distribution of larvae and pupae of 12 species of Aedes *are given.*

During 1969 field trials of Abate and Dursban (Tawfik and Gooding, 1970) for control of mosquito larvae, we made some observations on the ecology of mosquitoes which may be of use to mosquito control programs and in further research on mosquito problems.

Figure 1 shows the area covered by the City's mosquito control program during 1969, the areas treated with Abate, Dursban, and DDT, and the location of the six areas from which the information reported here was obtained. Two square miles were selected in the Dursban-treated area, 2.5 sq miles in the Abate-treated area, and two 0.5 sq mile sites in the untreated area. An effort was made to locate and mark all ponds at each site, which for purposes of analyzing the data, were classified as: Roadside pond (R): any accumulation of water near the edge of a road. Field pond (F): any pond situated away from a road and not in wooded land. Wooded pond (W): any pond situated away from a road and surrounded by or containing trees and/or shrubs. Ponds at the edge of a road but confluent with a field pond were classed as R-F, those confluent with a wooded pond as R-W.

Ponds of types F and W were treated by aerial application with insecticides adsorbed to granular clays, and R ponds were treated with emulsions applied by ground crews. Ponds of types R-F and R-W may have been treated by both methods. All applications were made for the City of Edmonton under the direction of Mr. J. D'Aoust.

Numbers of larvae and pupae taken in 10 dips were recorded for each pond at least once a week using an 800 ml dipper. Some of the larvae collected were isolated as 4th instars and reared to maturity so that identifications could be based on both the larval skin (using Carpenter and LaCasse, 1955) and the corresponding adult (using Graham, 1969). The number of females of each species reared from larvae collected during the period April 29 to June 5 are reported in table 1. Table 2 summarizes the information on each of the pond types in the six study areas.

Since the primary concern of our field activities was insecticide testing, our observations were co-ordinated with the City's spray program. As a result, data are not available for different areas on the same day. The data on the numbers of larvae plus pupae (table 2) are for just prior to the spray operations: R and R-F data were collected on April 22 for sites 1 and 2 and on April 23 for sites 3 and 4; F and W data were collected on May 2 for sites 1 to 4; all data for sites 5 and 6 were collected on April 28.

Influence of pond type on presence or absence of larvae

Some ponds of each type, roadside most commonly, were without larvae or pupae (table 2). In sites 1 to 4 only 27% of roadside ponds had larvae or pupae at the beginning of the season; all but one roadside pond dried up by June 12. Similarly we observed few, if any, larvae in ponds in cultivated fields. This was probably because eggs laid during the previous season would be buried during cultivation, the point needs to be confirmed since no data were recorded.

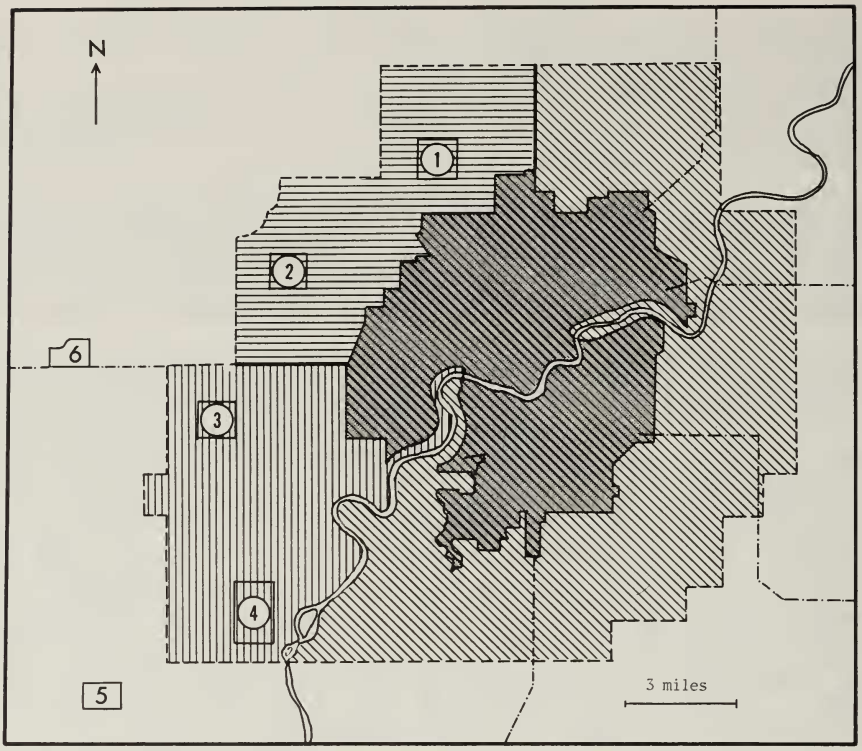

Figure 1. City of Edmonton (stipple) mosquito control area, 1969; Dursban treated area – horizontal lines, Abate treated area – vertical lines, and DDT treated area – diagonal lines. Study areas are numbered.

Table 1. The numbers of females of species of mosquitoes reared from larvae or pupae. Edmonton, Alberta, 1969. The sites refer to the locations indicated in figure 1.

Collection Date	April 29	May 6	May 7	May 8	May 14	May 21	June 4	June 5
Site Number	1 3	2	3 4	5 6	5 6	5 6	5	6
Aedes communis (DeGeer)	7		26					
A. excrucians (Walker)						1		
A. fitchii (Felt & Young)						12 4		
A. flavescens (Müller)				4		6 1	3	
A. hexodontus Dyar	4		2 2	15				
A. increpitus Vockeroth						29	13	
A. pionips Dyar	10			4 52	21 51			6
A. punctor (Kirby)		1		1				
A. riparius Dyar & Knab				9				
A. spencerii (Theobald)		6						
A. stimulans (Walker)	5		5	16 2		30 15	21	9
A. vexans (Meigen)	2					1		
Culiseta alaskaensis (Ludlow)							7	

Table 2. Relationship between pond type and mosquito incidence and population. Edmonton, Alberta, 1969.

	Roadside	Field	Wooded	R-F	R-W
Area 1 – Dursban treated					
No. positive/no. of ponds	8/18	12/16	0/0	2/2	0/0
No. dried* positive/no. positive	8/8	7/12		1/2	
No. dried negative/no. negative	9/10	4/4		0/0	
Larvae + pupae in 10 dips - mean	1.7	74.9		35.0	
Larvae + pupae in 10 dips - range	(0-14)	(0-500)		(30-40)	
Area 2 – Dursban treated					
No. positive/no. of ponds	4/11	8/16	4/5	8/10	0/0
No. dried* positive/no. positive	4/4	7/8	1/4	8/8	
No. dried negative/no. negative	7/7	2/8	1/1	2/2	
Larvae + pupae in 10 dips - mean	1.6	29.9	5.8	6.5	
Larvae + pupae in 10 dips - range	(0-8)	(0-130)	(0-14)	(0-30)	
Area 3 – Abate treated					
No. positive/no. of ponds	0/7	14/20	5/7	4/6	0/0
No. dried* positive/no. positive	0/0	10/14	3/5	4/4	
No. dried negative/no. negative	7/7	5/6	2/2	2/2	
Larvae + pupae in 10 dips - mean	0	23.2	88.1	24.2	
Larvae + pupae in 10 dips - range	–	(0-200)	(0-240)	(0-81)	
Area 4 – Abate treated					
No. positive/no. of ponds	2/16	5/6	2/2	5*/7	0/0
No. dried* positive/no. positive	2/2	5/5	2/2	5/5	
No. dried negative/no. negative	14/14	1/1	0/0	2/2	
Larvae + pupae in 10 dips - mean	0.3	24.2	19.0	6.9	
Larvae + pupae in 10 dips - range	(0-4)	(0-79)	(2-36)	(0-32)	
Area 5 – Untreated					
No. positive/no. of ponds	0/1	5/5	1/1	7/7	3/4
No. dried* positive/no. positive	0/0	2/5	1/1	4/7	3/3
No. dried negative/no. negative	1/1	0/0	0/0	0/0	1/1
Larvae + pupae in 10 dips - mean	0	67.6	175.0	46.9	20.0
Larvae + pupae in 10 dips - range	–	(26-79)	–	(16-106)	(0-56)
Area 6 – Untreated					
No. positive/no. of ponds	3/3	2/3	4/5	1/1	2†/2
No. dried* positive/no. positive	3/3	2/2	2/4	1/1	2/2
No. dried negative/no. negative	0/0	1/1	1/1	0/0	0/0
Larvae + pupae in 10 dips - mean	120.7	15.0	41.2	12	200.0
Larvae + pupae in 10 dips - range	(91-160)	(0-44)	(0-106)	–	(0-400)

* by June 12

**two ponds negative the first day but positive later

† one pond negative the first day but positive later

If sites 1 to 4 are representative of the remainder of the mosquito control area and if the presence or absence of mosquito larvae is independent of the size of the pools studied, it appears that treating all ponds in an area results in a waste of about 20% of the material, time, and effort in the treatment of wooded ponds and as much as 75% in the treatment of roadside ponds.

Influence of pond type upon numbers of larvae and pupae

All study areas had ponds classified as R, F, and R-F. In areas 1, 2, 4 and 5 these ponds may be ranked R, R-F, and F in order of increasing numbers of larvae plus pupae. In area 3 the R-F ponds had slightly more larvae plus pupae than F ponds and in area 6 R ponds had the greatest number. All areas except 1 have wooded ponds and the numbers of larvae plus pupae in these ponds varies from the second least (area 2) to the most abundant (areas 3 and 5). Only two areas had ponds classed as R-W; in area 6 this was the pond type with the greatest number of larvae plus pupae and in area 5 it had the second least. At sites within the City's mosquito control area (1-4) the numbers of larvae plus pupae in R ponds is so low that they should not be treated with insecticides.

COMPARISON OF SITES INSIDE AND OUTSIDE THE MOSQUITO CONTROL AREA

Of the 12 species of *Aedes* found during this study five occurred both inside and outside the City's mosquito control area; two were found only within the control area; five were found only outside the control area. The numbers of larvae plus pupae found in each pond type outside the control area were greater than those found inside the control area. The ponds outside the control area were examined several days after those inside the control area and this no doubt accounts for some of the differences observed.

CONCLUSION

The information summarized above indicates a need for research in mosquito ecology in the Edmonton area. Information arising from such a study could reduce both the costs of the City's mosquito control program and the amount of environmental pollution.

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